

## CLAIMS

1. A catalytic composition comprising a catalyst effective for catalysing asymmetric hydrogenation reactions, which catalyst requires acid activation,  
5 an acidic material effective for activating the catalyst, and a buffering compound or composition capable of forming, in the presence of the acidic material, an acetal, a ketal, a hemiacetal, and/or a hemiketal.
2. A catalytic composition according to claim 1, wherein the catalyst is a  
10 BINAP or other biaryl bisphosphine-based ligand catalyst.
3. A catalytic composition according to claim 1 or claim 2, wherein the catalyst is effective for catalysing the enantioselective hydrogenation of  $\beta$ -ketoesters.
- 15 4. A catalytic composition according to any one of claims 1 to 3, wherein the acidic material comprises a substrate suitable for asymmetric hydrogenation assisted by the catalyst.
- 20 5. A catalytic composition according to claim 4, wherein the substrate is ethyl-4-chloroacetoacetate.
6. A catalytic composition according to any one of claims 1 to 5, wherein the buffering compound or composition comprises acetone and methanol.
- 25 7. A catalytic composition according to any one of claims 1 to 6, wherein the buffering compound or composition is suitable for use as a solvent or solvent system in an asymmetric hydrogenation reaction carried out in the presence of the catalytic composition.
- 30 8. A process for the enantioselective catalytic hydrogenation of a hydrogenatable substrate comprising contacting the substrate with hydrogen and with a catalyst effective for enantioselective hydrogenation of the substrate, which catalyst requires acid activation, in the presence of an acidic material and a buffering compound or composition capable of forming, in the

presence of the acidic material, an acetal, a ketal, a hemiacetal, and/or a hemiketal, under conditions effective for enantioselective hydrogenation of the substrate.

- 5        9.    A process according to claim 8, wherein the catalyst is a BINAP or other biaryl bisphosphine-based ligand catalyst.
- 10       10.   A process according to claim 9 or claim 10, wherein the catalyst is effective for catalysing the enantioselective hydrogenation of  $\beta$ -ketoesters.
- 10       11.   A process according to any one of claims 8 to 10, wherein the acidic material comprises a substrate suitable for asymmetric hydrogenation assisted by the catalyst.
- 15       12.   A process according to claim 11, wherein the substrate is ethyl-4-chloroacetoacetate.
- 15       13.   A process according to any one of claims 8 to 12, wherein the buffering compound or composition comprises acetone and methanol.
- 20       14.   A process according to any one of claims 8 to 13, wherein the buffering compound or composition is suitable for use as a solvent or solvent system in the asymmetric hydrogenation reaction.
- 25       15.   Use of a buffering compound or composition in a process for the asymmetric catalytic hydrogenation of a substrate in the presence of an effective catalyst requiring acid activation, and of an acidic material for effecting such activation, which buffering compound or composition has the capacity to form an acetal, a ketal, a hemiacetal, and/or a hemiketal in the presence of
- 30       the acidic material, to improve the enantiomeric excess of desired asymmetrically hydrogenated product.